

## SEISMOLOGY.

W. J. HUMPHREYS, Professor in Charge.

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TABLE 1.—Noninstrumental earthquake reports, December, 1920.

Day.	Approximate time, Greenwich civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1920.	H. m.						Sec.			
1	1 30	Maricopa.....	35 05	119 23	4	1	10	None.....	Felt by many.....	E. F. Foulke.
		Taft.....	35 15	119 30	5	1		do.....	do.....	Associated Press.
4	11 55	Los Alamos.....	34 45	120 15	4	1	Long.	do.....	do.....	H. R. Gewe.
5	12 08	Maricopa.....	35 05	119 23	4	1	10	do.....	Felt by many.....	E. F. Foulke.
		Ojai.....	34 25	119 12	5	1	1	Faint.....	do.....	W. H. Duncan.
		Santa Barbara.....	34 23	119 40	5	1	10 ca.	None.....	Felt by everyone.....	A. W. Mutter.
6	20 25	Los Angeles.....	34 03	118 15	3	3	1	Rattling.....	Felt by many.....	R. F. Young.
13	17 37	Lone Pine.....	36 37	118 01	4	1	Several.	Rumbling.....	Felt by several.....	G. F. Marsh.
15	3 45	El Cajon.....	32 48	116 58	3	1	Few.	None.....	do.....	E. P. Kissler.
	3 57	San Diego.....	32 43	117 10						Associated Press.
18	17 26	Hemet.....	33 45	116 45	5	2	10	Loud.....	Felt by many.....	C. E. McManigal.
	20 30	Spreckels.....	36 35	121 38	3	1	2	do.....	do.....	S. I. Gleason.
19	12 15	Spreckels.....	36 35	121 38	3	2	3, 2		During thunderstorm.....	Do.
20	4 30	Brawley.....	32 59	115 40	4	2	5	Rumbling.....	Felt by many.....	M. D. Witter.
	5 15	Amos.....	33 05	115 18	5	2	Few.	do.....	do.....	R. H. Freeman.
		Blythe.....	33 35	114 45	3			None.....	do.....	W. J. Custer.
	5 31	Calexico.....	32 41	115 30	2	1	15	do.....	do.....	W. S. Pratt.
	14 46	Calexico.....	32 41	115 30	3	1	45	do.....	do.....	Do.
	15 10	Amos.....	33 05	115 18	3	1	Few.	do.....	do.....	R. H. Freeman.
	15 15	Blythe.....	33 35	114 45	3			do.....	do.....	W. J. Custer.
	15 45	Brawley.....	32 59	115 40	7				Shocks throughout day; felt heavily at Westmoreland also.	M. D. Witter.
21	14 48	Calexico.....	32 41	115 30	3	1	30	do.....	do.....	W. S. Pratt.
	15 00	Amos.....	33 05	115 18	4	1	Few.	do.....	do.....	R. H. Freeman.
	15 15	Blythe.....	33 35	114 45	4	1	Short.	do.....	do.....	W. J. Custer.
	15 40	Blythe.....	33 35	114 45	4	1	do.	do.....	do.....	Do.
	19 55	Salinas.....	36 36	121 40	3	1	3	do.....	Felt by many.....	E. D. Eddy.
	19 56	Spreckels.....	36 35	121 38	4	3	5, 7, 8	do.....	do.....	S. I. Gleason.
22	4 18	Spreckels.....	36 35	121 38	4	1	5	Rattling.....	do.....	Do.
28	1 55	Los Angeles.....	34 03	118 15	3	2	1	None.....	Felt by several.....	R. F. Young.
COLORADO.										
29	2 50	New Castle.....	39 30	107 30	5	1	5-10	None.....		M. L. Wellen.
	3 00	New Castle.....	39 30	107 30	4	2	3-4	Rumbling.....		Mrs. Cliff.
		Glenwood Springs.....	39 30	107 15	Light.	1	2	Faint.....	Felt by many.....	Mrs. C. M. Keen.
30	9 50	New Castle.....	39 30	107 30	5					M. L. Wellen.
30	17 50	New Castle.....	39 30	107 30	5					Do.
OREGON.										
15	18 50	Cascadia.....	44 15	122 30	3	1		Loud report.....	Felt by everyone.....	G. M. Geissendorfer.
TENNESSEE.										
24	7 ?	Crossville.....	36 00	85 00	5	2	60	Rumbling.....	No damage.....	J. E. Convers.
	8 ca.	Decatur.....	35 32	84 50	2				Awakened a few.....	J. W. Linard.
	8 30	Glen Alice.....	35 50	84 50	5	1		Rumbling.....		J. C. Owings.
	8 40	Spring City.....	35 40	84 50	3	1	60	do.....		A. D. Paul.
	8 30	Rockwood.....	35 50	84 40		1	3 min.	None.....	Felt by many.....	Mary E. Mason.
LATE REPORTS.										
OREGON.										
Nov. 9	20 30	Astoria.....	46 10	123 50	Weak.				Felt by several.....	C. C. Rosenberg.
28	11 45	Astoria.....	46 10	123 50	4	1			do.....	Do.

TABLE 2.—Instrumental reports, December, 1920.

[For significance of symbols and abbreviations, and for a description of stations and instruments, see the REVIEW for January, 1920, pp. 62-63.]

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A <sub>m</sub>	A <sub>N</sub>		
ALABAMA. Spring Hill College, Mobile.								
Dec. 16..								Instrument undamped.
	S <sub>N</sub> .....		H. m. s.	Sec.	μ	μ	Km.	
	L <sub>z</sub> .....		0 35 50				12000?	
	L <sub>x</sub> .....		0 57 20					
	L <sub>N</sub> .....		1 00 20					
	M <sub>m</sub> .....		1 08 00	25	*9,000			
	M <sub>N</sub> .....		1 14 30	20		*12,000		
	F.....		2 30 00					
ALASKA. U. S. C. & G. S. Magnetic Observatory, Sitka.								
1920.								Record lost between 12:45:44 and 12:52:22, including M and probably C. E-W not operating.
Dec. 16..								
	en.....		H. m. s.	Sec.	μ	μ	Km.	
	en.....		12 17 31					
	L <sub>N</sub> .....		12 27 01					
	L <sub>N</sub> .....		12 39 14	55				
	M <sub>N</sub> .....		12 45 44			8,390		
	F <sub>N</sub> .....		13 33 ..					

\* Trace amplitude.

TABLE 2.—Instrumental reports, December, 1920—Continued.

## ARIZONA. U. S. C. &amp; G. S. Magnetic Observatory, Tucson.

1920.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 10		e <sub>N</sub>	4 44 10					No record on N-S.
		L <sub>N</sub>	5 00 00	30				
		M <sub>N</sub>	5 08 35	15	40			
		C <sub>N</sub>	5 11 ..	15				
		F <sub>N</sub>	5 59 ..					
11		e <sub>N</sub>	21 30 54					Record difficult to interpret.
		e <sub>N</sub>	21 36 27					
		e <sub>N</sub>	21 36 52					
		e <sub>L</sub>	21 38 15					
		e <sub>L</sub>	21 39 20					
		M <sub>N</sub>	21 40 15	16	20			
		M <sub>N</sub>	21 40 20	16		10		
		C <sub>N</sub>	21 41 ..					
		C <sub>N</sub>	21 42 ..					
		F <sub>N</sub>	21 46 ..					
		F <sub>N</sub>	21 51 ..					
16		e <sub>N</sub>	12 24 16					
		e <sub>N</sub>	12 24 19					
		e <sub>N</sub>	12 31 48					
		L <sub>N</sub>	12 39 10					
		e <sub>N</sub>	12 39 40					
		L <sub>N</sub>	12 49 30	70				
		L <sub>N</sub>	12 49 30	75				
		M <sub>N</sub>	13 05 00	18	2,280			
		M <sub>N</sub>	13 11 11	22		440		
		C <sub>N</sub>	13 13 ..	20				
		C <sub>N</sub>	13 16 ..	17				
		F <sub>N</sub>	13 58 ..					
		F <sub>N</sub>	14 50 ..					
20		P <sub>N</sub>	14 47 42					
		e <sub>F</sub>	14 47 54					
		M <sub>N</sub>	14 49 00	4	40	10		
		L <sub>N</sub>	14 55 ..					

## CALIFORNIA. Theosophical University, Point Loma.

1920.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 5			15 00 00		100	100		Tremors during 24 hours preceding this time.
12			15 00 00		100	100		Light shock.
15			3 57 00		300	300		Tremors as above.
28			15 00 00		150	150		Do.
29			15 00 00		200	200		Do.
30			15 00 00		150	150		Do.
31			15 00 00		100	100		Do.

## COLORADO. Sacred Heart College, Denver.

1920.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 5-6								Activity at intervals on N-S component.
9		L <sub>N</sub>	2 40 ..					Very small waves.
		F <sub>N</sub>	2 55 ..					
16		P <sub>N</sub>	12 29 ..					S not visible.
		L <sub>N</sub>	12 55 ..	31		*3,000		
		L <sub>N</sub>	12 53 ..	33	*4,000			
		M <sub>N</sub>	12 57 ..	29		*8,500		
		M <sub>N</sub>	12 58 ..	27	*13,000			
		C <sub>N</sub>	13 26 ..	23-25				
		F <sub>N</sub>	14 00 ..					
25								Wavelets at intervals during day, especially on N-S.
31		P <sub>N</sub>	21 28 ..					Hardly any record on E-W.
		L <sub>N</sub>	21 33 ..					
		M <sub>N</sub>	21 49 ..					
		F <sub>N</sub>	22 05 ..					

\* Trace amplitude.

## DISTRICT OF COLUMBIA. Georgetown University, Washington.

1920.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 10		e <sub>N</sub>	4 38 ..					Very heavy micros.
		S <sub>N</sub>	4 47 44					
		e <sub>L</sub>	5 04 00	32				
		e <sub>L</sub>	5 05 18	27				
		L <sub>N</sub>	5 07 ..	27				
		L <sub>N</sub>	5 10 ..	22				
		F <sub>N</sub>	6 ca.					
11		e <sub>N</sub>	21 28 ..					Heavy micros.
		e <sub>N</sub>	21 27 11					
		S <sub>N</sub>	21 33 44					
		e <sub>L</sub>	21 38 42					
		F <sub>N</sub>	22 15 ..					
13		e <sub>N</sub>	4 17 11					Very heavy micros.
		L <sub>N</sub>	4 41 ..	30				
		L <sub>N</sub>	4 42 ..	30				
		F <sub>N</sub>	5 20 ..					
16		e <sub>P</sub>	12 24 32					Heavy micros.
		e <sub>P</sub>	12 24 26					Se not discernible.
		S <sub>N</sub>	12 30 47					
		e <sub>L</sub>	12 39 36					
		L <sub>N</sub>	12 52 ..	28				P possibly sooner.
		M <sub>N</sub> 1	12 59 46	30	*10,500			
		M <sub>N</sub> 1	13 09 ..	22		*9,300		
		M <sub>N</sub> 2	13 12 21	24		*13,700		
		M <sub>N</sub> 3	13 10 ..	24	*9,200			
		M <sub>N</sub> 2	13 05 ..	24	*14,100			
		F <sub>N</sub>	16 ca.					
		VERTICAL.						
		e <sub>P</sub>	12 24 29					Heavy micros.
		S <sub>N</sub>	12 30 24					
		e <sub>L</sub>	12 39 30	22				
		M <sub>N</sub> 1	13 09 ..	23	*5,700			
		M <sub>N</sub> 2	13 13 21	19	*6,200			
		F <sub>N</sub>	16 30 ..					
17		e <sub>P</sub>	19 11 20					Very heavy micros.
		e <sub>P</sub>	19 11 20					
		S <sub>N</sub>	19 20 43					
		S <sub>N</sub>	19 20 38					
		e <sub>L</sub>	19 40 06	10				
		L <sub>N</sub>	19 43 25	25				
		F <sub>N</sub>	20 20 ..					
25		L <sub>N</sub>	12 27 16	22				Heavy micros.
		L <sub>N</sub>	12 30 ..	22				
		F <sub>N</sub>	12 55 ..					

## DISTRICT OF COLUMBIA. U. S. Weather Bureau, Washington.

1920.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 10		P <sub>N</sub>	4 37 58				8,400	
		S <sub>N</sub>	4 47 38					
		e <sub>L</sub>	5 03 20					
		L <sub>N</sub>	5 25 ..	18				
		F <sub>N</sub>	5 50 ..					
11		P <sub>N</sub>	21 28 19				3,600	
		S <sub>N</sub>	21 33 43					
		e <sub>L</sub>	21 38 35					
		F <sub>N</sub>	21 55 ..					
13		e <sub>L</sub>	4 41 ..					
		F <sub>N</sub>	5 00 ..					
16		P <sub>N</sub>	12 20 07				9,500	China. P faint on NS: not shown on EW.
		PR1	12 24 29					
		S <sub>N</sub>	12 30 41					
		L <sub>N</sub>	12 49 ..	50				
		L <sub>N</sub>	13 00 ..	30				
		F <sub>N</sub>	15 20 ..					
17		P <sub>N</sub>	19 11 03				8,200	
		S <sub>N</sub>	19 20 32					
		e <sub>L</sub>	19 39 ..					
		L <sub>N</sub>	19 42 ..	18				
		F <sub>N</sub>	19 55 ..					
25		e <sub>N</sub>	11 53 30					Time corrections uncertain.
		S <sub>N</sub>	11 58 ca.					
		e <sub>L</sub>	12 26 ..					
		F <sub>N</sub>	13 ca.					

\* Trace amplitude.

TABLE 2.—Instrumental reports, December, 1920—Continued.

## ILLINOIS. U. S. Weather Bureau, Chicago.

1920. Dec.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
7		S?	15 33 50					
		L	16 07 ..	28				
		L	16 11 ..	22				
		L	16 13 ..	18				
		F	16 40 ca.					
10		P	4 38 12				8,900	
		S	4 43 16					
		L	5 05 ..	45				
		L	5 10 ..	30				
		L	5 22 ..	15				
		F	7 20 ca.					
11		P?	21 26 58				3,100	
		S?	21 32 46					
		L?	21 34 ..					
		L	21 41 ..	18				
		F	22 10 ca.					
13		P	4 11 37				4,100	
		S	4 17 30					
		eL	4 22 10					
		L	4 36 ..	40				
		L	4 38 ..	30				
		L	4 50 ..	16				
		F	5 30 ca.					
16		P	12 19 45				9,100	China; times of phases estimated as minute marker was not working. F on both components.
		S	12 30 00					
		PR	12 23 45					
		F	17 30 ca.					
16		eL	22 02 ..	30				Decreasing gradually.
		L	22 20 ..	16				
		F	23 ..					
17		P	19 10 49				9,000	
		S	19 21 ..					
		L	19 38 ..	35				
		L	19 50 ..	18				
		F	20 50 ca.					Lost in micros.
25		P	11 51 10				5,700	
		S	11 58 32					
		eL	12 30 ..	20				
		L	12 40 ..	15				
		F	14 05 ca.					

## MARYLAND. U. S. C. &amp; G. S. Magnetic Observatory, Cheltenham.

1920. Dec.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
16		PR1N	12 24 14	4				This interpretation adopted after comparison with Honolulu record.
		ePR1N	12 25 00					
		L	12 51 20	50				
		L	13 02 38	26				
		M	13 10 10	18		2,150		
		M	13 11 40	17	2,100			
		C	13 22 ..	16				
		C	13 27 ..	16				
		F	14 08 ..					
		F	14 25 ..					

## CANAL ZONE. Panama Canal, Balboa Heights.

1920. Dec.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
8		P	6 49 43				85	Direction unknown; generally felt.
		P	6 49 41					
		S	6 49 53					
		S	6 49 54					
		M	6 49 57		*4,000	*3,000		
		F	6 51 00					
		F	6 52 05					
10								Slight disturbance between 4:35 and 5:30 from distant movement; direction and distance unknown.
16		P	12 25 38				6,400 ca.	Probably S. or SW. Preliminary phases not on E-W.
		S	12 33 44					
		L	12 39 24					
		M	13 22 00		*4,000			
		M	13 25 02			*3,000		
		F	14 33 00					
		F	14 48 00					

\* Trace amplitude.

## VERMONT. U. S. Weather Bureau, Northfield.

1920. Dec.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
16		S	12 30 25					China.
		eL	12 46 ..	50				
		L	12 53 ..	30				
		L	13 01 ..	20				
		M	13 06 ..		*48,000			
		F	14 30 ..					

\* Trace amplitude.

## CANADA. Dominion Observatory, Ottawa.

1920. Dec.			H. m. s.	Sec.	$\mu$	$\mu$	Km.	
5		e?	10 30 30					Faint record, almost lost in micros.
		eL	10 37 18					
		L	10 39 30	20				Lost in micros.
7		eL	15 34 00	17				Two short records of L waves of small amplitude; balance obscured by micros.
		eL	15 51 30	23				
		F	Micros.					
10		O	4 26 19				9,020	Quakes reported from Honduras about this date, but no trace appears on records.
		iP	4 39 33					
		iS	4 48 45					
		eL	5 05 42					
		L	5 12 ..	21				
		L	5 25 ..	19				
		L	5 35 ..	16				
		F	6 00 ..					
11		O	21 25 41?				(2,470)	Very irregular micros of considerable magnitude obscure the record.
		(P)	21 30 45					
		(S)	21 34 48					
		(eL)	21 38 54					
		L	21 41 ..	22				
		F	22 ca.					
13		e?	4 19 25					
		eL	4 30 ..	40				
		L	4 52 ..	21				
		L	5 02 ..	16				Lost in micros.
16		O	12 06 45				9,590	Ottawa and Saskatoon define epicenter 41° N. 62.5° E., but arcs are almost parallel and long value poorly defined; epicenter occurred 41° N. but farther east; approx. 41° N. and 83° E., with possibility of center being even farther east.
		(P)	12 19 27					
		S	12 30 06					
		e	12 37 13					
		L	12 38 04					
		L	12 46 ..	60				
		eL	12 52 ..	45				
		L	13 07 ..	25				
		L	12 52 ..	36				
		L	13 20 ..	18				
		L	13 36 ..	17				
		L	13 55 ..	16				
		L	14 12 ..	15				
		LR1	14 17 ..	20				
		L	14 40 ..	18				
		L	14 55 ..	18				
		F	16 ..					Last hour's record very faintly marked.
SASKATOON RECORD.								
		O	13 05 56				9,600	
		P	13 18 39					
		S	12 29 19					
		SR1N	13 35 25					
		eL	12 44 ..					
		M	12 56 ..					
		F	15 ca.					
17		e	19 20 50					Not well recorded; probably occurred in Albania.
		eL	19 39 ..	35				
		L	19 48 18	20				
		L	20 00 ..	17				
		F	20 15 ..					
25		e	12 03 ..					
		eL	12 17 30	13				
		L	12 20 30	23				
		L	12 30 ..	18				
		L	13 10 ca.					

TABLE 2.—Instrumental reports, December, 1920—Continued.

CANADA. Dominion Meteorological Service, Toronto.

1920.		H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 5	eL.....	10 40 42					
	M.....	10 43 48		*600			
	F.....	11 18 12					
7	L.....	15 23 42 to 41 00		*300			Continuous L. waves of short periods.
	L.....	15 52 06 to 56 48		*200			Do.
	L.....	16 25 54 to 30 42		*200			
10	FeS.....	4 49 06					
	S.....	4 52 12					
	eL.....	5 01 00					
	eL.....	5 12 24					
	eL.....	5 14 36					
	L.....	5 28 42					
	eL.....	5 30 12					
	M.....	5 30 30		*1,000			
	L.....	5 42 18					May be a dual quake.
	eL.....	6 11 42					
	Lrep.....	6 48 24					
	Lrep.....	7 19 00					
	F.....	7 23 00					
11	S.....	21 34 24					S. not well defined and small ampli- tude.
	SR7.....	21 35 42		*200			
	iL.....	21 40 36					
	M.....	21 42 36		*1,000			
	eL.....	21 46 36					
	F.....	22 08 00					
13	e.....	4 42 18					
	eL.....	4 47 30					
	eL.....	5 03 00					
	M.....	5 04 18		*300			
	eL.....	5 06 18					
	F.....	5 19 42					
16	PR7.....	12 29 18					Real P. not recorded.
	S.....	12 30 18					
	SR1.....	12 31 36					
	SR2.....	12 34 24					
	SR3.....	12 39 00					
	i.....	12 45 00					Initial L. waves difficult to inter- pret.
	i.....	12 47 00					Group of L. sets in amp. 5 to 10 mm.
	i7.....	12 48 00					
	eL.....	12 49 06					
	L.....	12 51 48					
	iL.....	12 56 12					
	M1.....	13 00 48		*44,000?			Principal group sets in.
	M2.....	13 07 48					
	M3.....	to 08 48		*45,000?		9,625?	Approx. epicenter lat. 47 N., long. 114 E., or 42 N. and 141 E.
	M3.....	13 13 06					
	M3.....	to 18 00					
	M3.....	to 23 18		*25,000?			
	iL.....	13 54 24					
	L.....	14 16 00					
	L.....	14 55 48					
	Lrep.....	15 40 00					
	Lrep.....	15 48 00					
	F.....	16 57 00					
17	eL.....	19 35 54					Eq. reported from Mendoza, Argenti- na, at 2.57 and 3.29 p. m.; also quake reported from Albania.
	L.....	19 45 12					
	eL.....	19 50 06					
	L.....	19 52 24					
	L.....	19 59 18					
	M.....	19 53 18		*400			
	F.....	20 14 00					
25	e.....	12 22 48					
	i.....	12 27 24					
	iL.....	12 29 30					
	iL.....	12 31 30					
	eL.....	12 35 18					
	M.....	12 40 36		*1,300			
	eL.....	12 59 54					
	F.....						Micros.

\* Trace amplitude.

CANADA. Dominion Meteorological Service, Victoria.

1920.		H. m. s.	Sec.	$\mu$	$\mu$	Km.	
Dec. 5	P.....	10 55 31					P. may be L. phase.
	M.....	10 57 00		*200			
	F.....	11 41 45					
5	P.....	22 26 21					
	L.....	22 40 30					
	M.....	22 45 00		*200			
	F.....	22 51 00					
7	L.....	15 49 16		*100			Times doubtful; no cut-off.
	F.....	15 53 10					
7	L.....	15 59 04		*200			Do.
	F.....	16 03 40					
10	iP.....	4 51 58					Sharp easterly movement at 4h 57m 23s; line per- fectly straight previous to 4h 51m 55s.
	iS.....	4 57 23					May be a dual quake.
	L.....	5 14 36					
	M.....	5 18 32		*1,000			
	eL.....	5 43 09					
	eL.....	5 47 08					
	eL.....	5 54 57					
	Lrep.....	6 27 39					
	L.....	6 38 33					
	Lrep.....	6 51 15					
	F.....	7 01 49					
11	L.....	21 36 43					L. may be S. phase
	eL.....	21 47 18					
	M.....	21 51 35		*600			
	F.....	22 03 57					
13	P.....	4 05 07					
	S.....	4 11 33					
	L.....	4 22 57					
	M.....	4 29 54		*1,500		3,630	
	F.....	4 39 20					
16	P7.....	12 19 27				7,000?	P. waves not dis- tinct and begin- ning of S. doubt- ful.
	S.....	12 25 06					
	SR17.....	12 26 44					
	SR2.....	12 28 22					
	SR3.....	12 29 10					
	SR4.....	12 30 22					
	i.....	12 34 04					
	iL.....	12 36 50					
	L.....	12 44 02					Group of L. sets in; principal portion begins.
	L.....	12 49 20					
	L.....	12 51 10					
	L.....	to 01 30					
	M.....	12 54 35?		*35,000?			
	L.....	13 04 32					
	L.....	13 08 28					
	L.....	13 18 20					
	L.....	13 29 14					
	L.....	to					
	L.....	15 07 14					
	eLrep.....	15 23 20					
	eL.....	15 36 14					
	eL.....	16 09 56					
	F.....	16 19 12					
VERTICAL.							
	P.....	12 16 30	2.5			5,320	Times of S. and L. difficult to deter- mine, and mi- nute contacts on smoked paper weak.
	S.....	12 25 30	6				
	L.....	12 35 00	30			50	
	M.....	12 53 00	30				
16	L.....	21 51 43					
	M.....	21 54 11		*200			
	F.....	21 58 07					
25	S.....	11 55 43					
	L.....	12 02 39					
	i.....	12 21 22					
	M.....	12 28 26		*800			
	i.....	12 30 46					
	F.....	13 24 28					

\* Trace amplitude.

## NONINSTRUMENTAL EARTHQUAKE REPORTS, CANADA.

November 8, Joliette Seminary, Quebec, approximate time, 15 h. 25 m.: Several feeble shocks felt, duration 6 to 7 seconds. Window frames trembled.

December 7, Atlin, B. C., approximate time, 4.30 a. m.: One sharp shock followed by tremor which lasted about 15 seconds. Number of persons awakened, direction from south to north.

Reports for December, 1920, have not been received from the following stations:

HAWAII. U. S. C. & G. S. Magnetic Observatory, Honolulu.  
 KANSAS. University of Kansas, Lawrence.  
 MASSACHUSETTS. Harvard University, Cambridge.  
 MISSOURI. St. Louis University, St. Louis.  
 NEW YORK. Canisius College, Buffalo; Cornell University, Ithaca; Fordham University, New York.  
 PORTO RICO. U. S. C. & G. S. Magnetic Observatory, Vieques.

# SEISMOLOGICAL DISPATCHES RECEIVED AT THE SEISMOLOGICAL STATION, GEORGETOWN UNIVERSITY, WASHINGTON, D. C.

[Associated Press.]

*Avlona, Albania, December 5, 1920.*—An earthquake occurred in the Tepeleni district to the southwest of this city to-day, rendering 15,000 persons homeless.

The Asama-Yama volcano, situated 90 miles northwest of Tokyo, has been in eruption for several days. Ashes are falling over a wide area.

*Valdivia, Chile, December 14, 1920.*—The volcano Lanin is reported to be in a state of eruption.

*Valdivia, Chile, December 14, 1920.*—According to a traveler from Pucón, an earthquake in the Vallarica district began at 11 p. m., December 13, and lasted three hours. No fatalities reported.

*Peking, China, December 16, 1920.*—An earthquake was felt here at 8:20 p. m. The earth rocked buildings and created much excitement in the hotels and clubs.

*Santiago, Chile, December 17.*—A dispatch from Pucón, Province of Valdivia, states that the volcano Villarica is still discharging flame and lava and that earth tremors continue.

*Santiago, Chile, December 17, 1920.*—Strong earthquakes were felt at Mendoza, Argentina, at 2:57 o'clock this afternoon. They were repeated at 3:29 o'clock according to a dispatch received here. No casualties reported.

*Paris, December 17, 1920.*—Two violent earthquakes visited Algiers, each lasting several seconds.

*Rome, December 18, 1920.*—New earthquake shocks have completed the destruction of the village of Tepeleni. Twenty persons are reported killed.

*Buenos Aires, Argentina, December 18, 1920.*—One hundred and fifty persons are reported as killed in an earthquake which occurred yesterday afternoon in the village of La Valle, Province of Mendoza. La Valle was apparently the center of the disturbance. Houses collapsed and crevices were opened in the streets through which hot water gushed forth.

*Buenos Aires, Argentina, December 18, 1920.*—Minor shocks continue throughout the district, one particularly strong tremor being felt yesterday afternoon at 5:30 o'clock in the towns of San Martin and Rivadavia.

*Brindisi, Italy, December 19, 1920.*—Advices from Saseno give details of the earthquake which occurred concurrently with the earthquake shocks signaled in America. A number of houses disappeared in a great landslide. Thirty deaths are reported.

*Buenos Aires, Argentina, December 20, 1920.*—Earth tremors occurred again to-day.

*Tokyo, Japan, December 20, 1920.*—A wireless message from the island of Yap to-day announces that the most violent earthquake shocks occurred in the vicinity of the island, lasting several days.

*Tirana, Albania, December 22, 1920.*—Forty-two persons were killed, 200 were injured, and 500 made homeless by the recent earthquake in the Tepeleni district, it was learned to-day.

*Tokyo, Japan, December 23, 1920.*—A Shanghai dispatch to the Ashia Shimbun reports a terrific earthquake in Kan-su Province on December 16, with casualties estimated at 2,000.

*Tokyo, Japan, December 23, 1920.*—The continued activity of the volcano Asama is causing alarm. Violent explosions occurred in the crater on Wednesday evening and the country for many miles around was strewn with ashes. The towns around the volcano suffered from heavy earthquake shocks and showers of ashes. It is feared that the loss of life is great.

*Rockwood, Tenn., December 23, 1920.*—An earthquake of considerable violence accompanied by a rumbling sound was felt here and at other towns as far south as Spring City at 2 o'clock this morning.

*Buenos Aires, Argentina, December 24, 1920.*—A prospector reports that on December 17, the same day the earthquake occurred in Mendoza Province, he was near to Mount Cavalaria. He felt a severe shock lasting 50 minutes which threw him to the ground. Afterwards he discovered a crater emitting incandescent lava, hot water and smoke.

F. A. TONDORF, S. J., Director.

TABLE 3.—Late reports (instrumental).

## ALABAMA. Spring Hill College, Mobile.

No earthquakes were recorded at this station during November, 1920.

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A <sub>E</sub>	A <sub>N</sub>		

## ALASKA. U. S. C. and G. S. Magnetic Observatory, Sitka.

1920.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 16	eN		8 34 32					
	eE		8 37 40					
	FN		8 42 ..					
	FE		8 43 ..					

## ARIZONA. U. S. C. and G. S. Magnetic Observatory, Tucson.

1920.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 16	eE		8 45 14					Trace only on Ns.
	eL		8 52 33					
	M		8 54 02	9	30			
	C		8 55 20					
	FE		9 07 ..					

## HAWAII. U. S. C. and G. S. Magnetic Observatory, Honolulu.

1920.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	e		17 11 12	18				
	L		17 21 36					
	C		17 33 12	18	*700			
	F		17 42 ..	18				
	F		17 51 ..					
6	e		21 33 30					Slight record.
	M1		21 43 00	17	*100			
	M2		21 52 00	17	*100			
	F		22 02 ..					
16	P		8 48 30					Slight record; phases not apparent.
	e		8 53 42					
	M		9 12 30	17	*100			
	F		10 03 ..					
29	P		8 17 18					
	L		8 19 42					
	M		8 20 30	15	*500			
	C		8 26 ..					
	F		8 45 ..					

\* Trace amplitude.

## MARYLAND. U. S. C. and G. S. Magnetic Observatory, Cheltenham.

1920.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 16	eFN		8 39 05	3				Phases not clearly marked: ePe faint.
	eP		8 39 03					
	eE		8 47 51					
	eL		8 53 41					
	L		8 53 00					
	M		8 53 48					
	M		8 53 52		60	30		
	C		8 55 00					
	F		9 02 00					
	FN		9 05 00					

## PORTO RICO. U. S. C. and G. S. Magnetic Observatory, Vieques.

1920.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 4	P		2 12 38					Seems to be near shock.
	eN		2 13 06					
	M		2 13 24		70			
	M		2 13 38			150		
	C		2 16 ..					
	F		2 22 ..					
	FN		2 23 ..					
6	P		10 45 24					Do.
	P		10 45 26					
	L		10 45 52					
	M		10 46 08			400		
	M		10 46 14		120			
	C		10 49 ..					
	F		10 54 ..					
	FN		10 55 ..					